

IN THE CLAIMS

A complete listing of the pending claims follows:

Claims 1 – 108. (cancelled)

109. (currently amended) An in-process ratio mass spectrometry system, comprising:

a spike reservoir;

a spike dilution apparatus coupled to the spike reservoir and configurable to dilute a spike from the spike reservoir having a first concentration to produce a processed spike having a diluted second concentration;

a mixer coupled to the spike dilution apparatus and configurable to mix the processed spike and an extracted sample having at least one analyte to permit equilibration therebetween;

an atmospheric pressure ionizer (API) coupled to the mixer and configurable to ionize the equilibrated extracted sample and processed spike to produce ions;

a mass spectrometer coupled to the API and configurable to process the ions by ratio determination; and

a control system adapted to automatically configure the spike dilution apparatus, the mixer, and the API, and the mass spectrometer such that the sample is automatically mixed with the processed spike, ionized, and processed by the mass spectrometer, the control system being further configured to use the ratio measured by the mass spectrometer to characterize the concentration of the at least one analyte in the extracted sample.

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110. (previously presented) The system of claim 109, further comprising:

a sample extraction apparatus configured to extract the extracted sample from at least one process solution, wherein the control system is further configured to control the sample extraction apparatus such that the extracted sample has a predetermined volume.

111. (previously presented) The system of claim 110, wherein the at least one process solution comprises a plurality of process solutions, the sample extraction apparatus being further configured to extract the sample from a process solution selected from the plurality of process solutions as controlled by the control system.

112. (previously presented) The system of claim 109, further comprising a chemical modification apparatus configured to chemically modify the processed spike.

113. (previously presented) The system of claim 109, wherein the spike dilution apparatus includes a plurality of dilution sub-modules arranged from first dilution sub-module to a last dilution sub-module, wherein each dilution sub-module is configurable to achieve a dilution selected from a range of possible dilutions, wherein the first dilution sub-module is configurable to dilute the spike having the first concentration to a first diluted concentration, the second dilution sub-module is configurable to dilute the spike at the first diluted concentration to a second diluted concentration, and so on such that the last dilution sub-module is configurable to provide the spike diluted to a last diluted

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concentration, and wherein the control system is operable to configure the appropriate combination of dilution sub-modules to produce the processed spike having the second concentration.

114. (cancelled).

115. (cancelled)

116. (cancelled)

117. (cancelled)

118. (previously presented) The system of claim 109, wherein the spike dilution apparatus is configurable to select from a plurality of spike sources to produce the spike having the first concentration.

119. (currently amended) A method of automatically analyzing an analyte, comprising:

diluting a spike having a first concentration to produce a processed spike having a second concentration; ~~wherein the second concentration is selected based upon an estimate of a concentration of the analyte in a sample;~~

mixing the processed spike and the sample to produce an equilibrated mixture of the processed spike and sample;

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ionizing the equilibrated mixer using an atmospheric-pressure-ionizer to produce ions;

processing the ions in a mass spectrometer to produce a response ratio; and
characterizing the concentration of the at least one analyte using the response ratio.

120. (previously presented) The method of claim 119, wherein the response ratio is an isotopic ratio.

121. (cancelled)

122. (previously presented) The method of claim 119, further comprising: selecting the sample from a plurality of process solutions.

123. (previously presented) The method of claim 119, wherein the diluting the spike act comprises successively diluting the spike having the first concentration to produce the processed spike having the second concentration.

124. (cancelled)

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